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Overcoming the Text-Book Shortage

From many angles the war has caused the population to take a saner view of the more serious matters of life. It is obvious that in pre-war days as a nation we were too extravagant and placed too little value on materials just because they were plentiful. Paper, string, food, fuel and many other commodities have been the subject of national economy campaigns, but now there is approaching a dearth of technical books and literature. New text-books keep appearing, but they usually amplify, but in no way replace standard works. In our own field, we find that two movements are operating which call for an increasing supply of technical books. The first is the creation and extension of the works' library. This is no doubt due to the demands of the Services causing changes in manufacturing processes, coupled with a demand for economies in the use of raw materials in short supply. The second is the increase in the number of classes organised for the teaching of foundry work. To meet these demands there are two obvious courses to be taken; one is that the private individual should unload on to the second-hand market any standard text-book no longer required. If they be out of date, then the dealer will refuse to accept them and they can then be diverted to the paper salvage drive. The second is the pooling of resources. By this we mean that an ironfoundry embarking upon the manufacture of steel castings could probably borrow from the steel concerns the books which they have difficulty in procuring, as the latter will no doubt be *au courant* with their contents. If the situation deteriorates further, then recourse will have to be made to the use of microfilms. This wonderful system enables the whole of the literature of such a large subject as foundry practice to be housed in a suitcase!

The works library should differ from those belonging to the municipalities by creating for themselves, week by week, extracts from every available source germane to their manufactures. One large concern has a member of its staff virtually permanently located at the library of the Patent Office, where everything of a technical nature of interest to the firm is abstracted. Much of the material so gathered is made available for industry in general in the form of a bulletin. It occurs to us that more time of many works' librarians could be usefully spent in the great national, or even local, libraries than in their own departments. There is usually a much larger mass of material available, and careful scrutiny will often reveal opportunities for economy in the purchases of lesser applicable magazines. For the smaller works, this examination of current literature is a problem of great difficulty, incapable of solution under wartime conditions. It is, however, mitigated in some measure by regular attendances at trade and technical meetings, where members are quite willing to give practical advice. In one area, the Institute of British Foundrymen, through its local Council, is acting as a technical panel to the district foundries. Again, the bureaux of information organised by the Institute and by the various raw material interests are functioning to the great advantage of the war effort, in spite of the claims which the Services have made upon their personnel. Finally, a few employers' associations are becoming more technically minded and the first action of the new Bronze and Brass Founders' Association was to form a technical committee, whilst the publication of the Light Alloy Founders' Association on the use of solid fuel is a second example. The libraries of the research associations also help to minimise the effects of the present shortage. All these activities are helping in no small measure to overcome these wartime difficulties of the dissemination of information useful to the national effort.

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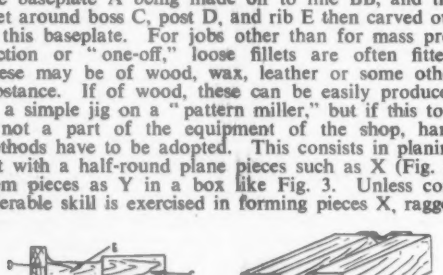
PATTERNMAKING WRINKLES—V

THE USE OF FILLETS

By "CHIP"

Many patterns are made without fillets in corners and for one-off jobs are entirely satisfactory, providing the moulder is informed that a fillet is required. This is often done by marking a red or blue pencil line in the corner, thus drawing the moulder's attention to the need for a fillet. For standard work, fillets are mostly cut from the solid timber. Fig. 1 shows a method adopted in making small bracket patterns. The baseplate A being made off to line BB, and the fillet around boss C, post D, and rib E then carved out of this baseplate. For jobs other than for mass production or "one-off," loose fillets are often fitted. These may be of wood, wax, leather or some other substance. If of wood, these can be easily produced by a simple jig on a "pattern miller," but if this tool is not a part of the equipment of the shop, hand methods have to be adopted. This consists in planing out with a half-round plane pieces such as X (Fig. 2) from pieces as Y in a box like Fig. 3. Unless considerable skill is exercised in forming pieces X, ragged



edges result. This can be obviated by running a gauge along the edge and planing to this line as Z (Fig. 2), when the dotted line shows the original piece and the full line the finished fillet. The thickness of H need only be a bare $\frac{1}{16}$ in., and when the fillet is glued in position on the pattern, it can be easily rubbed down with glass paper and so making a neat and tidy job. Another point to be noted in making this type of fillet is to make the angle θ in Y (Fig. 2) to correspond to the pattern where a certain amount of taper is allowed, otherwise the fillet will be a poor fit and result in an unsatisfactory job.

When leather fillets are being used, they can be fitted much more easily if prior to securing in position they were placed in a box, as Fig. 3, and rubbed with a dumb-bell shaped tool. A number of these tools with differing diameter ends will be found useful. Thin glue or shellac varnish should be used to fasten the leather fillet to the wood pattern. For wax or other composition dumb-bell shaped tools of metal are admirably suited. It is always advisable to fit all fillets to a pattern before commencing the rounding of any edges of brackets, etc., to ensure a neat job.

PHILPLUG

A PLASTIC ASBESTOS COMPOUND

Since its introduction the versatility of Philplug has been rapidly recognised. Its uses are manifold and the fact that it is simply and quickly manipulated makes it an effective time-saver. Briefly, it is a plastic asbestos compound which can be used for all wall-plugging operations, for anchoring machines to the floor and for any similar operation in any climate—above ground or underground. It is impervious to wide variations in temperature and humidity, it is waterproof and weatherproof, and it is a most effective "damping" material so far as sound vibration is concerned.

Since it is used in a plastic state, the careful drilling of the holes is not essential, thus obviating the necessity of skilled labour in the preparatory stages. Other characteristics of Philplug are that it will carry its full load immediately (even when plastic); screws inserted in Philplug may be withdrawn and replaced as often as required without destroying the thread; it will not cause corrosion or the rusting of screws, and it becomes an integral part of the masonry or other surrounding fabric the moment it hardens.

A variety of accessories for use with Philplug is available, and covers almost every need likely to be encountered in modern construction and equipment. For example, the Philbolt is an efficient and inexpensive accessory for fixing foundation bolts in any kind of masonry; and the tools—drills, wall boring tools and jumpers, screw-thread formers, etc.—available are adequate to meet all situations.

Philplug inserts have been used with conspicuous success for anchoring chairs to concrete railway sleepers despite the vagaries of the weather (extreme heat, damp or frost) and the fluctuating heavy loads. To date, some 800,000 Philplug sleeper inserts have been supplied. Further evidence of the versatility of Philplug is provided by the fact that it was the material chosen for fixing 7,000 $\frac{1}{2}$-in. coach screws in work associated with the Severn Tunnel, and it is the only plug that has proved completely satisfactory for use in underground factories. It is exclusively used in such establishments. The manufacturers are the General Electric Company, Limited.

INSTITUTE OF BRITISH FOUNDRYMEN

NEW MEMBERS

In the list of new members of the Institute elected last month and given in our issue of October 29, Mr. J. O. Price and Mr. J. E. Farrer, of C.V.A. Jig Moulds & Tools, Limited, elected as Associate Members, should have been described as foundry superintendent and foreman patternmaker, respectively. This list of new elections brings the total membership of the Institute to over 2,500, and not to over 1,500 as previously stated.

MECHANICAL HANDLING IN FOUNDRY PRACTICE*

Review of Present Foundry Practice from the Standpoint of the Mechanical Handling Engineer

By D. CHERRY PATERSON

It is proposed to approach this subject from the mechanical handling engineer's point of view, and not from that of the foundryman. In the foundry, where so much handling equipment is employed, the mechanical handling engineer has great scope for ingenious design. The plant he handles is not a process plant, as he cannot have the complete knowledge of sands and moulding methods, etc., which the foundryman possesses, although it is necessary that he should know intimately the characteristics of the materials to be handled, how they are to be employed and the process of manufacture, in order to design the proper equipment for the duty, and give continuity to the lay-out. It is therefore for this reason that the title of this Paper is "Mechanical Handling in the Foundry," and not "Mechanisation in the Foundry."

The founding of metals is an ancient craft, and tradition surrounding the methods of the moulder is reluctantly relinquished, and it may be that, because the foundry industry maintained these old methods of practice so long, when mechanical handling equipment and manufacturing machines were introduced, they became revolutionary; consequently the word "mechanisation" was applied to every type of equipment which was put into the foundry.

The mechanical handling engineer at the outset must obtain from the foundryman a complete survey of the operations of the plant, quantities, capacities, conditions of the materials or units at various stages, etc., in order to lay out a comprehensive scheme which will enable the foundryman to manufacture his product by having materials and equipment necessary for his output carried economically from point to point throughout the foundry.

Mechanical handling may be described as a means of moving material in units or in bulk, either from point to point or in a continuous process. As this idea had developed in the foundry, one finds almost every form of mechanical handling equipment is now employed throughout the different stages of manufacture. For example, in lifting and moving plant—as apart from conveying—one finds the overhead travelling crane, the jib crane, the wall travelling crane, the underhung crane, the transfer crane, the overhead runway, the electric hoist block, the cupola charging telpher, or crane, and the cupola hoist.

On the conveying side application is found for the belt conveyor, the scraper conveyor, the slat conveyor, the push-plate conveyor, the mould plate conveyor and the overhead chain conveyor, the bucket elevator, the swing tray elevator, the skip hoist and the cupola charging hoist, gravity roller conveyor and power-driven roller conveyors.

FIG. 1.—OVERHEAD CRANE IN A FOUNDRY.

Incorporated in the lay-out with those, there are the storage hopper with shute feed, the hopper with bottom gate feed or sliding plate opening feed, the rotating circular plate hopper, the hopper with conveyor forming the bottom, and the shakeout, also portable conveyors, elevators and trucks.

There are also units which form part of a mechanical handling scheme, but which should more properly be called "machines," for which the mechanical engineer must legislate, such as aerators, screens, mills and such-like.

Raw Materials Handling

Mechanical handling starts with the receiving into the foundry of the raw materials—the sand, the pig

* A Paper read before the London Branch of the Institute of British Foundrymen, Mr. R. B. Templeton presiding.

Mechanical Handling in Foundries

iron, the scrap, the coke, etc., and choice must be made of the unit which will deal most economically with them, considering the layout of the railway sidings, the yard storage position and the distribution.

An overhead crane may span railway sidings and grab or lift the material from the wagons, electric magnets may be used for off-loading the scrap, for hoppers adjacent to the wagons may feed conveyors to carry bulk material, such as sand, for instance. The means of conveying these various materials to their appointed places in the manufacturing process is the next consideration.

FIG. 2.—1½-TON OVERHEAD ELEVATOR RUNWAY FOR BATH BOXES.

From the conveyor or elevator boot into which the operator shovels the sand, it is carried to the storage hopper inside the foundry—the pig, coke and scrap may be loaded into bins in the yard, from which it is lifted by a crane and dumped on the cupola platform or an adjacent store, or automatically charged into the cupola direct in weighed quantities.

An overhead runway may be carried conveniently over the various piles to lift the loaded bins, which may be of the bottom opening type, pass them over a section of the runway forming a weighing machine and run them into a hoist. They are then elevated to the cupola platform level, where they run off on another runway and await feeding into the cupola without being removed from the runway trolley throughout the journey.

Once the raw materials are inside the foundry, mechanical handling takes a very large place in the production of castings on which the plant is engaged. Different methods are required for handling different products, and the work the foundry engages in determines the choice of equipment. In a continuous production plant for units such as cylinder blocks, automobile parts, and so on, the layout is comparatively easy. In all cases the handling of the sand for re-use is treated in a somewhat similar manner.

Metal Handling

Considering a foundry doing general work by floor casting and assuming that the cupola has been charged as already described and the moulds prepared, the first point to consider is getting the molten metal from the cupolas to the mould. In heavy foundries this is done by an overhead crane. Fig. 1 shows an example of the usual overhead electric crane. There are many types, of course, and methods of control, and even the smallest foundry must have an overhead crane of some kind. The only point in design that such a crane may differ from the standard unit is that creeping speeds are frequently incorporated to facilitate the opening and closing of boxes. In lighter classes of foundry, however, a system of overhead runways is a very efficient method whereby the metal is transported in ladles, taking, say, 5 to 10 cwts., through the foundry, along the passage-ways between the moulding rows. From this supply the individual moulders obtain their hot metal in the small hand shanks and carry them up their rows, pouring as they go. This system means that the passages are kept free from obstruction, such as is always found when floor bogies on tracks are used.

Fig. 2 illustrates an overhead runway for very heavy boxes, the capacity being 4½ tons. The runway passes over the moulding positions, the low head room for such a heavy electric hoist block is noticeable. The lifting is electric, with creeping speed, and the travelling by hand gear.

Considerable complications sometimes arise owing to the position of the cupola in relation to the moulding shop, and great care must be taken in designing the layout to avoid congestion at the cupola spout; here, loops are sometimes formed in the runway so that empty ladles can form up awaiting their turn to go into the supply point without holding up incoming empties or outgoing full ladles.

Movable switches are also employed to serve various lines of take-off, and other means which the mechanical engineers devise. The usual equipment, of course, is the rolled steel H-section runway track with a four-wheel ball bearing trolley running on the under flange, from which the ladle is suspended. No hoisting tackle is provided here, the ladle being preserved always at one height. This is a most effective means of distributing the metal throughout the foundry, and has been very successful in many plants where the continuous moulding system is not suitable.

Fig. 3 shows a wall jib travelling crane with push-

Mechanical Handling in Foundries

button control for all three motions at the jib head. This was designed for lifting pots out of furnaces between where the operator stands and the wall. The operator moves along with the crane, clear of the furnaces having all the movements of the work under his easy control. Very little room is taken up with this unit and it does not interfere with the overhead cranes and no supporting structure is required as the bottom single rail is on the floor next the wall and the top rail is fastened to the building columns.

Sand Handling

The next consideration is the handling of the sand. This very large question is one that has perhaps the most important place in the mechanical handling equipment of the foundry. In considering the many layouts which can be made up for this type of plant, care and thought in co-operation with the foundry executives should result in a comprehensive layout suitable to the work and conditions of the particular foundry.

It is very tempting for the engineer or foundry manager striving to arrive at the perfect layout, to keep constantly changing the position of individual units here and there, and whilst the object is to obtain greater efficiency with a more comprehensive and easily worked layout, these considerations can go on so long as not only to hold up production, but actually to spoil the scheme.

Research should be made to arrive at the very finest layout and labour economising design, bearing in mind all the circumstances of site, local conditions, type of labour available, product to be manufactured, and its adaptability to different types of production. To begin at the beginning of a cycle of a sand handling equipment, the shake-out is the first operation. The boxes are taken from the mould conveyor and transferred to the shake-out grid. There are various means of doing this according to the size of the castings.

From Cast-up Boxes to Shake-out

Fig. 4 shows the mould conveyor loaded with boxes passing the knock-out position. The chequer plate, cover plates and grid have been removed and the shake-out conveyor rising out of the pit with the magnetic band across it is just discernible. In the case of small boxes, these are easily pushed or lifted from the one unit to the other; for larger castings, the shake-out grid should be built to the same level as the mould conveyor and hydraulic or pneumatic pushers transfer the boxes to the grid. Small swivel jib cranes can also be used for this duty, either with an ordinary chain block or an air hoist. As the lifting is only a matter of an inch or two, to enable the box to swing clear, the lifting tackle employed is not tremendously important. The transfer of the boxes from the mould conveyor to the shake-out must always be done at the same place, and there can be one to four, or even more, shake-out positions.

Fig. 5 shows one method of transferring boxes from the moulding machines to the mould conveyor. The light overhead runways are adjacent to the moulding machines and each leg curves round over the mould conveyor embracing about three plates. In this scheme, as the drags are put on first and the tops close the box whilst on the conveyor, the runway over the line of the conveyor facilitates this. The lifting and lowering is done by ordinary chain blocks with short hand chains, and one pull is sufficient to lift the box off the machine.

The sand is shaken into the grid by means of jarring equipment. There are various methods of extracting the sand quickly from the boxes, and one efficient way is to have a section of the grid put

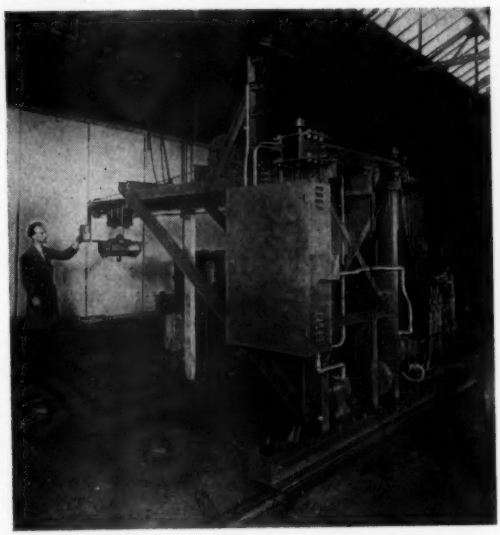


FIG. 3.—WALL JIB CONVEYOR WITH PUSH-BUTTON OPERATION OF ALL THREE MOTIONS AT JIB HEAD FOR LIFTING MOULDS OUT AND IN PITS BETWEEN OPERATORS AND CRANE TRACK.

in rapid vibratory motion by means of air vibrators, these being controlled by a valve adjacent to where the operator stands. When the sand is completely emptied from the boxes, the latter are lifted, either mechanically or by hand, and placed on a unit such as a gravity conveyor which brings them to the moulding machines. The casting itself is put on a cooling conveyor, the best type of which is the overhead chain with hooks at frequent intervals, from which the castings are suspended. A pendulum tray conveyor or a steel slat conveyor can also be used for this—the type of casting should decide the choice—but the objection is that as the castings lie on the trays

FIG. 4.—MOULD CONVEYOR PASSING KNOCK-OUT POSITION.

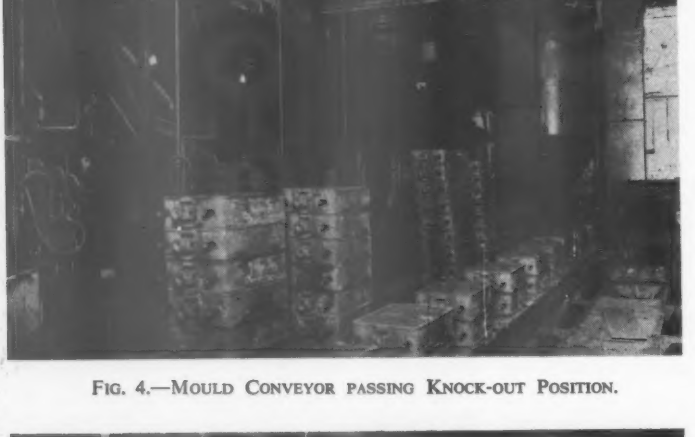


FIG. 5.—OVERHEAD RUNWAY FOR TRANSPORTING BOXES FROM MOULDING MACHINES TO THE MOULD CONVEYOR.

or slats they do not have the same circulation of air round them as when suspended so that cooling takes longer.

Returning to the shake-out, the sand has now fallen through the grid and on to the belt conveyor which forms the bottom of the hopper under the grid. The shake-out pit should be very carefully designed; it should be easy for attendants to get in without discomfort, easy steps should be formed in the concrete, and a man should be able to work upright when in the pit. Good lighting should be permanently fixed in the walls so that attendance is made easy to the maintenance engineers. This also enables this part of the plant to be kept clean; the great importance of keeping this plant clean and regularly lubricated in accordance with the designers' recommendations must be emphasised. Many annoying stoppages can be eliminated and often a major breakdown prevented by the management looking after this important function. Also the foundryman should be patient with the mechanical handling engineer when he demands good pits and more room around the transfer points.

From Shake-Out to Reconditioning Plant

As several boxes may be emptied at one time and a considerable volume of sand is dumped on to the conveyor, where it passes out of the pit, a means of checking this excessive flow (such as an adjustable gate) should be provided, so that the normal quantity for which the belt is designed should only be allowed to pass through. It is frequently necessary to carry this belt at a slope, and care should be taken here that the angle is not so steep as to cause little balls of sand to roll back. Actually 17½ deg. has been found to be about the ideal slope, although a slightly steeper rise is permissible in certain conditions. Sand dust and steam are very heavy in the air and extraction plant may be used to clear this atmosphere away from the workers.

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Across the shake-out conveyor at some convenient position, a magnetic separator, of which there are various well-known makes, should be provided, so that pieces of metal in the sand may be removed at the end of this conveyor before the sand is deposited into the next unit, either the boot of an elevator or a conveyor. It is then elevated vertically, or on a sloping conveyor and fed into a storage hopper, through a vibrating screen of double or single deck, or a rotating or hexagonal type. The shake-out conveyor must run flat (not troughed) and it should be of generous width so that there is no danger of a sudden surge of sand overflowing. Elevators should be used if conveyors are not possible owing to local conditions. Conveyors offer fewer cleaning problems, they give more time for cooling the sand before it is deposited in the hoppers. If elevators are used, care should be taken in the design, that the boot is large enough, the pit has ample clearance to enable a man to undo easily the inspection doors for cleaning, oiling, etc., and that the buckets are of ample capacity. The buckets should be attached to a rubber-covered belt. Chain elevators are not recommended because of the abrasiveness of sand giving the chain a very short life.

The feed into the elevator should be at a point about the third bucket from the bottom on the vertical. This ensures filling the buckets and avoids dredging. Also, as a belt invariably runs slightly from side to side as it travels, the width of the feed shute must be carefully designed so that the side movement of the bucket will not be such as to miss the flow of sand in any position.

An elevator should be run clear of sand before closing down for the night, then thoroughly cleaned, as otherwise sand left in the boot becomes packed, and difficulty is often experienced in starting next morning. This difficulty, of course, varies with the type of sand being used.

A certain amount of spillage of sand always occurs in these elevators and, if the design will permit, it is a good thing for the pit to be kept as shallow as possible, or, better still, that there is not a pit at all, but this means more floor space is required to enable the conveyor to rise the necessary height for feeding, which is not always possible. It is, of course, better still if elevators can be dispensed with altogether and belt conveyors used, but while this design involves considerably more space, it is one which should be carefully considered.

Storage Hoppers

The storage hoppers can be cylindrical, square or rectangular, have vertical sides or they may taper towards the bottom. The base of the circular type of hopper is formed by a horizontal plate of a diameter considerably in excess of the hopper outlet, which revolves by means of a motor and reduction gear underneath—like a gramophone table. Considerable care is required in the design of this unit, and the avoidance of bridging of the sand must be of paramount importance. The rotating plate has a cone mounted at its centre, the base of which is slightly less than the opening of the hopper, and which projects up into the hopper for a distance relative to diameter. It is a debatable point as to whether this cone should be provided at all; on the other hand, stirrers are sometimes attached to it which break up the sand.

A plough is set at an angle across the plate between the hopper outlet and the edge in order to divert the sand into the hopper of the next conveying unit. This plough is adjustable vertically and angularly and the operator will quickly ascertain the best position to give correct flow and quantity of sand required. Fig. 6 shows the circular plate feed from the hopper into the elevator. To get the necessary slope in the feed chute to the elevator, the latter is sunk in a pit. The conditions at the site made this unavoidable. The outlet of the hopper should have

FIG. 6.—EXAMPLE OF A SAND HOPPER WITH CIRCULAR PLATE FEED.

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a girth plate—adjustable—so that the volume of sand allowed to surge on to the plate shall not be too great to be controlled by the plough.

From Sand Preparation to Moulding Machine

From this hopper sand is diverted into another vertical bucket elevator, where it passes through the mills and preferably an aerator and on to a further conveyor which is carried over a platform running at an elevation alongside the moulding machines, and at such a height as to allow the sand to be ploughed

FIG. 7.—OVERHEAD CONVEYOR SHOWING PLOUGHS FEEDING IMMEDIATE SUPPLY HOPPERS.

off the conveyor and enter small feed hoppers, from which the operator of the moulding machines can obtain supplies of sand as required. These supply hoppers are fitted with quick-acting doors so that the operator pulls a lever and receives the required quantity of sand and immediately he lets go the supply is cut off. Fig. 7 shows the conveyor loaded with sand. The third plough is down and the sand being diverted at that point into the hopper. The belt is flat and there is good width to take the full capacity. The empty boxes have now been deposited at the side of the moulding machines, and the operation of actual moulding is proceeded with and the boxes are carried from the moulding machines, either by a gravity conveyor, small hoist or other convenient means and deposited on the mould conveyor.

At this stage the cores are put in the mould either before being placed on conveyor or whilst on it, and these should be carried on pendulum trays suspended from an overhead chain conveyor as described later.

New Sand Additions

The introduction of new sand into the sand plant is done in a variety of ways—a new sand hopper is frequently placed near the railway siding or lorry position where the sand is delivered. From this hopper a belt conveyor is carried over to a small storage hopper contained in the plant. From this hopper is drawn as required an additional amount of new sand and is fed, as a rule, into one of the mills. There seems to be no definite ruling as to how much new sand is required and when it is to be added; these are questions for the foundryman. The provision of the means to do it mechanically should be in the scheme, and so designed that the foundryman can add the quantity at will.

(To be continued.)

SPALLING OF FIREBRICK

The Refractories Section of the National Bureau of Standards, Washington, D.C., has been investigating the A.S.T.M. method of test for determining the thermal and structural spalling of fireclay brick. One of the requirements of this test is that when the bricks are given the preliminary heat-treatment at 1,600 deg. C. for 24 hrs., the pressure within the gas-heated furnace should be kept between 0.2 and 0.6 in. of water.

In order to obtain information concerning the effect of gas pressure within the furnace on the spalling properties, several brands of firebrick were tested, states "Technical News Bulletin," using pressures of about 0.2, 0.4 and 0.6 in. of water. In the case of one brand of brick, the spalling loss was 1.5 per cent. when the furnace pressure was maintained at 0.2 in., but this loss was increased to 7.2 per cent. and 10.8 per cent. when the pressure was maintained at 0.4 and 0.6 in. respectively. A second brand, which lost 15.6 per cent. in the spalling test when a pressure of 0.15 in. was maintained in the reheat furnace, showed no change in spalling resistance, even though the pressure was increased to 0.5 in. Another brand, which spalled 13.2 per cent. when reheated under a pressure of 0.15 in., lost 27.4 per cent. when the furnace gas pressure was increased to 0.35 in. Other brands tested showed similar trends.

New American Blast Furnaces

American output of steel could be much increased if the War Production Board would make available materials to complete 16 new blast furnaces, stated Mr. C. M. White, of the Republic Steel Corporation, recently. He indicated that only one of 17 blast furnaces for which the industry has need has been completed. The completion of 16 additional furnaces would increase the national output of steel by 6,000,000 to 7,000,000 tons annually.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

Production of Uniform Steel for a Light Castings Foundry

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—Though both Mr. Kain and Mr. Sheehan believe that steel blowing is not an art, I cannot agree, as it depends on the steel being made. I agree that a person can be trained to blow in three or four weeks, but his limit of steel-making will be very small. He will be able to regulate the air pressure and turn down the blow when the carbon has been removed. This, no doubt, could be called a precision operation, but could it be called a precision operation to produce a steel of 0.90/0.80 per cent. C without recarburising? I have for day in and day out produced steel to the following specifications without recarburising:—

Ball-bearing steel ...	... 1.00 per cent. C
High carbon ...	... 1.05 to 0.95 per cent. C
High carbon ...	... 0.90 to 0.80 per cent. C
High carbon ...	... 0.75 to 0.65 per cent. C
Ni Cr	... 0.20 per cent. C max.
Ni Cr	... 0.15 per cent. C max.
Bar iron	... 0.08 per cent. C with 0.10 max.

The last three-mentioned steels naturally need no recarburising, but nevertheless require skill in blowing. I would assure these gentlemen this cannot be done in any other way except by the skill of the blower and sample passer.

In Mr. Sheehan's opinion it was possible to produce steel with a constant air pressure of 2½lbs. Of course, it is possible to produce steel with this pressure. It is possible to produce it with even 1½ lbs. pressure, but the blow will take longer, due to the lighting up period taking longer.

The colour of the flame is no indication of the air pressure, but definitely an indication of temperature. A brilliant white flame will always produce a hot and fluid steel, whilst a yellow-golden flame denotes a cold charge.

I am at present working on 75 per cent. scrap/25 per cent. pig-iron charge. It has been my experience that the fluidity falls with the increase of scrap, therefore the nature of the charge should depend on the fluidity required and the size of castings being made. For example, if castings of 25 to 30 cwts. are being made and will take the whole of the charge, it should be possible to use 100 per cent. scrap, but if on the other hand, as in the writer's foundry, where the castings weigh slightly less than 8 lbs., the fluidity from 100 per cent. scrap charge would not be good enough to run off the whole of the charge before skulling took place. Therefore the "keep" period should determine the scrap-pig ratio charge. I agree with Mr. Kain on the 75 to 25 ratio in view of producing steel for light castings, as stated in his Paper. Readers may be interested in the results of an experiment which I carried out a few days ago with a view to increasing the "keep" period of steel in the ladle. My experiment covered only lip pouring. The steel from the converter was de-slagged and 2 lbs. per ton of a material named "Minicrop" was sprinkled on the surface of the steel, which was then covered with approximately 1 in. of damp sand. A deep lip was made on the ladle and a brick placed across the lip forming a trap for any sand likely to flow over with the steel. The "keep" period was definitely increased. Fluidity of the steel was as good at the end of the pour as at the beginning. The experiment was carried further and a smaller amount of ferro-silicon than that normally used was added to the furnace during the blow. The reduction was from 30 lbs. to 10 lbs., the fluidity was such as to ensure freedom from "skulls" and "short runs." Chemical analysis of the metal was taken to determine whether or not there was any pick-up in carbon from Minicrop. Nine tests were taken from nine different stages of the pouring. Results were as follows:—

Before Minicrop was added, No. 1 sample, 0.18% C
After Minicrop was added, No. 2 sample, 0.19% C
After Minicrop was added, No. 3 sample, 0.19% C
After Minicrop was added, No. 4 sample, 0.18% C
After Minicrop was added, No. 5 sample, 0.18% C
After Minicrop was added, No. 6 sample, 0.18% C
After Minicrop was added, No. 7 sample, 0.19% C
After Minicrop was added, No. 8 sample, 0.18% C
After Minicrop was added, No. 9 sample, 0.18% C

This product obtains its effect by producing an insulating layer *in situ* on the surface of the metal.

I am afraid I cannot quite agree as to the amount of importance attached to the question of building in of the tuyeres. It has been my experience that any trouble encountered during the blow can be caused by quite a number of factors, and not always by the tuyeres, providing, of course, they are free from slag or metal to allow the free passage of air. These reasons for trouble can be:—(1) Cold furnace; (2) cold metal; (3) metal set too heavy on the tuyeres; (4) metal not quite up to the tuyeres, and (5) metal containing 1.5 per cent. or over manganese.

According to Mr. Kain, if tuyeres are set as he suggests, there will be no trouble during the blow. I have never found this to be the case, nor have I ever found it possible to blow by the clock—(19 minutes as stated). We usually get over 100 heats per set of tuyeres, and I have found on many occasions where, for example, three heats will blow without giving the slightest trouble. The next one or two will give trouble; the next two or three will again blow without trouble, and so on—all off the same tuyeres. The reason being usually one of the five reasons mentioned above. It is recognised that the first heat of the day is likely to cause trouble due to the temperature of the furnace, and not because of the tuyeres. This does not mean, of course, that the tuyeres can be put in in any fashion, but I have never found it necessary to use any elaborate jig.

As regards time taken for blowing, no set time can be given with a great degree of accuracy. It is usually somewhere in the neighbourhood of 18 to 20 mins., under normal conditions. Low silicon iron will

blow very much quicker than high silicon iron, but the fluidity will be affected. I am afraid that 100 per cent. scrap charge at 1.2 per cent. of silicon, as stated by Mr. Sheehan, would not give a fluidity suitable for the running of small castings. He would undoubtedly have a quick blow. A shallow bath blows quicker than a deep bath.

I agree with Mr. Cooper that converter steel is more fluid than other processes; some authorities attribute this to a greater percentage of dissolved oxygen in converter steel.

It may interest some foundrymen to know that the writer is managing a steel foundry in which he is the only person who has ever been in a steel foundry before. It is producing 40 to 50 tons of castings per week. The majority of our plant can be termed "home-made," and 60 per cent. of my labour are females.

Yours, etc.,
T. HUNTER,
Works Manager.

Alston, Cumberland.
November 1, 1942.

The New Association of Bronze and Brass Founders

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—I have read with interest your report of the inaugural meeting of the Association of Bronze and Brass Founders and would say at once that we, who have for nearly fifty years been the national association of the brassfoundry industry, welcome the advent to organisation of the heavy side of the industry.

With reference to the remarks made by Mr. S. H. Russell that his firm and others are specifically prevented by existing agreements from joining any second association which handles wages, and membership of my association is thereby ruled out, if he is referring to membership of the largest of such associations, he must be labouring under a misapprehension, since quite half of my members already belong to this organisation as well as to the Brassfounders' Employers' Association.

In any case, our wages agreements, which were the original cause of our formation, only apply to the Birmingham-Wolverhampton area. Indeed, our activities have since developed into so many fields as to have caused wages to involve only a small fraction of our time.

We look forward to the closest possible collaboration between the new association and this body.—Yours, etc.,

EDGAR N. HILEY,
Secretary.

The Brassfounders' Employers' Association,
106, Edmund Street, Birmingham, 3.
November 3, 1942.

"Herr Doktor"

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—I read your leading article with great interest and can fully endorse your statements relative to Continental college-trained "engineers."

Over a period of about ten years I had a number of these gentry working with me on the Continent, and their chief qualifications seemed to be volubility and the ability to wear a white coat and keep it clean. I remember one "Herr Doktor" engineer in particular, who travelled the Ruhr with me; we had some repairs to make to an 80-ton steel ladle we had rammed for the Vereinigte Stahlwerke at Dortmund, and whilst I went down into the ladle to do the job the Herr Doktor—who was quite a young man, incidentally—sat on the top watching me. After about 30 minutes' work in this very warm ladle I called to him to come down and give me a hand, and his reply was, "Oh, no, Herr Gray; I come not here to work but to regard." This remark typifies the attitude of these "Herr Doktor" engineers to their job.

Of course, the desire and ability to keep the hands clean is not confined to Continental engineers, as I have found with some engineers I have employed over here, but, taken by and large, the British engineers will usually not be above to getting down to the job.—Yours, etc.,

T. H. GRAY.

Kettering.
November 2, 1942.

SCRAP NON-FERROUS METALS AND RUBBER

Due to the vital need of saving non-ferrous scrap, there are two methods whereby it can be collected efficiently. First, pay the operators on the machine tools so much a lb. for the bagging of their own scrap. They could put it into bags when they were either waiting for something or when the machine was cutting, providing the duration of the cut was long enough. The operators would be keen in saving the scrap seeing that they were going to earn a little extra which would be an incentive to use their idle time. This method could be applied where ends of rubber cables have to be bared. Secondly, supervisors and production staff should plan for each machine tool to be allocated with jobs of the same class of material, also machines to be batched together with different classes of material such as brass jobs together, copper jobs together, etc. This will eliminate having to clean a machine bed out thoroughly when changing over from brass to steel. The two methods would reduce the amount of mixed scrap and collect a greater amount of proper scrap for the war effort.

Nickel Bulletin.—The work abstracted in the October issue of the Nickel Bulletin deals with powder metallurgy, fatigue tests for the evaluation of corrosion, new aluminium-bronze and phosphor-bronze specifications, special bronzes for worm gears, and modifications made in wartime emergency steel compositions. Copies of this publication may be obtained, free of charge, from The Bureau of Information on Nickel, The Mond Nickel Company, Limited, Grosvenor House, Park Lane, W.1.

STEEL CASTINGS FOR MORTAR SHELLS*

DETAILS OF AMERICAN PRACTICE

By J. B. NEALEY

One of the largest manufacturers of malleable and steel castings in America, with plants in several parts of the country, undertook to cast high-explosive mortar shells of the type shown in Fig. 1. Under the guidance of the Ordnance Department of the U.S. Army, it developed an electric furnace steel and process that are highly successful. One plant of this company has made a million 60-mm. mortar shells in the past few months and is well into the second million.

In determining the type of steel to be used, physical characteristics rather than chemical analyses were the guiding factors. The problem was to find a steel that would meet certain fragmentation requirements. Experiments were conducted at one or more of the Ordnance research and manufacturing arsenals to determine the most destructive type of fragmentation. The resulting specifications for the 60-mm. mortar shell called for a steel that, when fragmented by a high explosive, would break up into parts of such an order that 80 per cent. of the fragments would remain on a four-mesh screen. Many steels and many heat-treatments were tried and discarded. The steel being used at present for cast shells is so heat-treated as to produce maximum ductility. This steel has a minimum yield point of 15 tons per sq. in., with an elongation of 30 per cent. in 2 in. and a reduction of area of 50 per cent. After machining, the 60-mm. shell must have a volume capacity of 8.7 cub. in. and shell performance to-day is so closely regulated that a variation of greater than 0.1 cub. in. will not be tolerated.

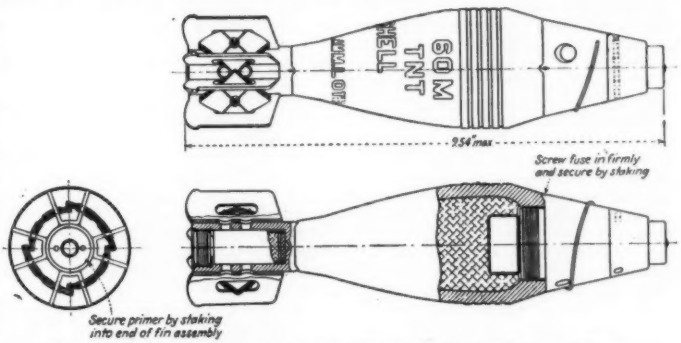


FIG. 1.—GENERAL APPEARANCE OF 60-MM. TRENCH MORTAR SHELL.

Melting Practice and Casting

Standard foundry practice, with few variations, is used in casting 60-mm. shells. Production is carried on in a foundry some 850 ft. long by 75 ft. wide, equipped with five motor-driven overhead travelling cranes, and innumerable swing post or jib cranes. At one end of this building are located four electric, carbon-arc, tilting-type steel-melting furnaces. These run in capacity from 35 cwts. to 10 tons. Two are Hèroult furnaces and two Swindell Dressler.

The 10-ton furnace rests on a double section of gear segments which allow it to tilt back and forth. Tilting of the furnace is effected by a hydraulic lifting cylinder. Graphite electrodes of 12-in. dia. extend from a supporting structure down through the roof. Electrodes and roof are elevated and swing to one side for charging. A charging bucket with a segmented bottom is used for placing the scrap charge into the furnace. The furnace is lined with refractory silica brick, and acid-melting practice is employed.

The melting of a charge requires a little more than an hour and is divided into three periods. The first is the high-voltage period, 195 volts being used to melt a hole in the charge and radiate as much heat into the body of the charge from the sides of this hole as possible. After approximately half an hour, the current is reduced to 140 to 160 volts and the melt completed in about another half-hour. At the end of that period the current is again reduced, this time to about 124 volts, and, for something like 10 min., the heat is "worked" and a boil is produced by adding iron ore to the molten metal. The iron ore reacts with the carbon in the melt to form carbon monoxide and other oxides, thereby reducing the carbon content to approximately 0.15 per cent. A sample is then taken and analysed to obtain the exact carbon content.

The accumulated first slag, which is often too great in volume to permit efficient working, is raked off through the pouring spout and a second slag of sand and lime is added to form a thin, protective covering, and to prevent excess oxidation. The furnace atmosphere is under constant observation and control. Ten minutes after the first test, a second sample is dipped and analysed for both carbon and manganese. The melt is then brought up to the final specification by adding ferro-manganese and silicon of an exact analysis. A pouring temperature of 1,638 to 1,666 deg. C. is necessary. If below this range, wrinkles form on the inside surface of the shell. If above, the high temperature causes fusion of sand to the casting surface.

A bottom-pour ladle is lowered into the pouring pit after all alloy additions have been made and the heat ready to tap. During the transfer of molten metal from furnace to ladle, final deoxidisers in the form of aluminium and calcium silicon are added to the metal in the ladle. The ladle, holding 10½ tons of molten

* Extracted from "The Iron Age," August 13, 1941.

Steel Castings for Mortar Shells

metal, is now taken to the pouring floor.

The shells are cast in a three-part mould, consisting of the cope, cheek and drag, with steel and brass patterns for each. Sixteen shells are cast to a mould. The drag is moulded on jolt, rollover, squeeze Osborn machines and the cheek and cope on jolt, squeeze Milwaukee machines. The cores for the inside of the shell are set in the drag with a pouring gate core in the centre. A core-setting gauge is used to centre the cores. The cheek and cope are then added, the mould clamped together and run out on to the moulding floor. The cope serves only to house the feeders for the 16 shells.

The metal is poured into the sprue and flows into gates which are connected to four feeders, which serve to keep the shell castings solid and free of voids and slag inclusions. There is a vent between each pair of castings for the escape of gases.

Materials Handling

Production at this plant is divided into units of two and three moulding machines, sand hoppers and pouring conveyors. Each unit has two parallel roller conveyors in front of it. Moulds are collected on the nearest conveyor and moved to the second by a transfer car. From here they are moved out on to the pouring floor on a series of parallel roller conveyors some 50 ft. in length. Pouring is directly from the big bottom-pour ladles which are brought from the furnaces by crane. At the further end of the pouring floor is a collecting conveyor consisting of two parallel tracks with short roller frames riding on them. These are pulled along by an endless chain. Moulds are placed on these frames and transferred at the shake-out by crane. The freed castings are then sent to the break-off floor, where a man with a hammer knocks the shells off the sprues. The gates are ground off and the feeders removed with a high-speed cut-off wheel. Shells are then numbered according to heat, tumbled and heat-treated. A unit of three moulding machines will turn out between 9,000 and 10,000 shells every 24 hrs.

Sand from the shake-out is moved by an apron conveyor, first to an overhead storage, then to sand mills for reconditioning, and finally to hoppers directly over the moulding machines. A cereal and clay binder is used in the moulding sand.

Core Making

Cores are made from new sand to which is added, in the sand mill, core oil or a dry binder and cereal as a green binder. After mixing, core sand is stored in a hopper over a blowing machine. Hinged steel coreboxes are placed by hand under this machine, which blows them full of core sand. The cores are then placed on trays and dried in an oven of the continuous type. This oven is built on columns and is located 7 or 8 ft. above the floor. Some 50 ft. in length, the oven contains a conveyor consisting of two endless chains carried on sprockets, and between the chains are suspended swinging trays 25 by 92 in. At one end of the oven is an opening through which one end of the conveyor extends downward almost to the floor. Men load and unload the cores on to this exposed end of the conveyor. Separate from the oven is a hot-air heater and the heated air is blown into the oven by fans. The heating period and temperature are both controlled automatically. Baking time is approximately ½ hr., and the temperature 450 deg. F.

Heat-treatment

The heat-treatment given the shells consists of an operation or cycle known as "triple heat-treatment." One furnace some 15 ft. wide and 36 ft. long is used. It is a radiant-tube-type furnace with a series of gas-fired, hairpin-shaped radiant tubes located both above and below the hearth. Both ends of the tubes extend through the side of the furnace, a gas burner firing into one open end. The hot products of combustion travel through the tube and are vented through the other end. No burned gases can escape into the heating chamber to dilute a prepared atmosphere which is introduced into the furnace from a separate unit. There are 30 of these tubes, fired by as many burners.

While the same temperature is carried throughout the length of the furnace, the burners are manifolded for zone temperature control, and recording pyrometers are used. Extending beyond each end of the furnace is a loading platform of the same dimensions as the heating chamber. The furnace hearth and these platforms are composed of a series of 12 rails mounting small wheels. The entire area of one platform is covered with trays linked together to form one solid sheet or floor. The shells are loaded on to these trays and the entire load pulled into the furnace by chains. It is pulled out at the other end when the heating period has elapsed.

The purpose of the heat-treating cycle is to break up the "as-cast" crystalline grain structure and produce a structure with a maximum amount of ferrite so as to give the ductility specified.

The shells are then tumbled, shot-blasted inside, and the nose pressed in a hydraulic press, so the machining chuck can have a smooth surface to grip. In the top of the housing of the shot-blasting is a rail in the form of a circle. Suspended from this is a series of frames, each consisting of three parts which hold a small steel plate. In this plate is a hole slightly smaller than the big end of the shell. An operator loads these fixtures with shells and the whole is indexed intermittently about the circle. At one point in their travel, each shell passes over six sand-blast nozzles. The first cleans the upper part of the inside and the others progressively clean various portions until the bottom is reached.

Inspection

For inspecting the shells, a table is provided with a centring post, the end of which is exactly contoured to fit the closed inside end of a perfect shell. A shell

(*Continued on page* 242.)

PUBLICATIONS RECEIVED

The Routine Analysis of Aluminium Alloys, by Sydney Torrance, Ph.D. Published by High Duty Alloys, Limited, Slough.

This very useful pamphlet covers the subjects of sampling and analysing aluminium alloys. The actual methods of estimating all the usual elements are set out in such detail that they could readily be followed by the average works trained laboratory assistant. A note on the back page states that the services of the technical staff of this company are freely available for the possible solution of problems arising in the light alloy foundry industry.

Memorandum on Testing Arc and Gas Welders. Published by the Department of the Controller-General of Research and Development, Ministry of Supply, Berkeley Court, Glentworth Street, London, N.W.1.

This is a particularly worthwhile pamphlet, as it sets out a system of testing the efficiency of arc and gas welders. The method disclosed is centred around the actual welding of standardised pieces of various types and the awarding of marks for competency. Helpful forms are reproduced for assisting the management to record the results shown.

Tin-Base Bearing Metals, by W. T. Pell-Walpole, B.Sc., Ph.D., J. C. Prytherch, B.Sc., and B. Chalmers, D.Sc., Ph.D. Published by the Tin Research Institute, Fraser Road, Greenford, Middlesex.

In this pamphlet (No. 111) the conditions for obtaining efficient bonds are considered, and the many factors affecting these conditions in manufacturing operations are examined. A large number of tests are described which indicate the most suitable methods of preparing and tinning the bearing shell, and of casting and cooling the lining. The results of thousands of individual tests show the effects of variations in alloy composition, mould design, temperature of metal and mould, and rate and direction of cooling, in relation to both hand-pouring and die-casting and also to centrifugal methods of production. The part played by shrinkage cavities at or near the bond is also examined, and methods of operation are suggested by which this trouble may be avoided. Copies of this Paper may be obtained free of charge from the Tin Research Institute.

Workmen's Compensation. Issued by the Accident Offices Association, 1, Throgmorton Street, London, E.C.2.

This particular subject is never, so far as the reviewer is aware, covered by any tutorial courses normally followed by those qualifying for works management. Yet, sooner or later, the executives find themselves responsible for the handling of compensation cases, and usually they muddle through quite successfully. After studying this most important sixteen-page pamphlet, it is clear that greater knowledge should be possessed by responsible works officials, and it is difficult to envisage a better channel for acquiring the necessary information than using it as a textbook. As no price is indicated, it seems reasonable to assume that a free distribution is being made, and it is suggested that those interested should send to the publishers an 8½-in. by 5-in. stamped addressed envelope. The pamphlet contains a well-reasoned argument in its last few paragraphs for retaining the existing system after a few simple, but essential, changes have been legalised.

Memorandum on Brazing. Published by the Department of the Controller-General of Research and Development, Ministry of Supply, Berkeley Court, Glentworth Street, London, N.W.1.

It is doubtful whether the information contained in this 28-page well-illustrated pamphlet has ever been made in so readily accessible a form, if indeed it exists at all. The booklet is divided into eight sections, the first of which differentiates the process from welding. Next the reader is introduced to the process and the equipment which is normally employed. In section 4, four alloys—the brasses, silver alloys, the series containing phosphorus, and finally copper—are detailed as to melting range and applicability. The notes on fluxes are perhaps a little too abbreviated and could usefully be extended. The two best sections are the penultimate and the last, the former entering into considerable detail on the questions of design and strengths of brazed joints, and the latter, contained in more than 12 pages, is devoted to a study of operating methods. Apparently this booklet is being distributed free of charge to those interested, and recipients can, indeed, count themselves fortunate.

NEW CATALOGUES

Mould and Core Drying. Four leaflets received from Modern Furnaces & Stoves, Limited, of 275, Long Acre, Nechells, Birmingham, 7, outline in some detail a range of furnaces designed for the economic drying of cores and moulds. Some of the designs shown are new to this country, and present features of interest rendered of great importance than in normal times in view of the present drive to save fuel. One feature incorporated is a recuperation of heat, reinforced by the oil fumes evolved where this medium is used for bonding the cores.

Pulley Blocks.—Herbert Morris, Limited, of Loughborough, have sent us a 32-page well-illustrated booklet entirely devoted to describing the manufacture, testing and performance of a line of worm-gear pulley blocks having a lifting capacity ranging between 5 cwts. and 60 tons. The method of dealing with the subject has been to tell something of the care needed in manufacture and testing, followed by some notes on the purchasing of the standard pulley blocks. The subject is then expanded to include extended applications by mounting the blocks on monorail, using them in association with travelling hoisting jibs, or as wall attachments.

RECENT WORK ON LEADLESS GLAZES

In Germany, war has brought back a problem which they had during the last World War, *viz.*, the elimination of lead and boric acid in whiteware glazes, states "Ceramic Age." There it is generally considered that lead-free glazes are more sensitive to sulphur in kiln gases than glazes containing lead. Steger's recent experimental work in the United States indicated that glazes with good resistance to kiln gases containing sulphur could be made with suitable composition. Na_2O and Li_2O must be avoided, therefore borax cannot be used. CaO should replace Na_2O. BaO should be omitted from the lead-free glaze. Part of the harmless CaO can be replaced by MgO. The best content of boric acid is about 15 per cent., with 55 per cent. SiO_2 in the melted glaze. There have been a number of researches in Germany along these lines.

STEEL CASTINGS FOR MORTAR SHELLS

(*Concluded from page* 240.)

cast with the core out of alignment is immediately revealed by a gauge arm on another post when the shell is rotated. The shells are then tested for porosity by placing them in a fixture which clamps four at a time through rubber cups and introduces air under 150-lb. pressure. The clamping fixture is then submerged in water to detect air leaks through the castings.

While it is estimated that approximately half the high-explosive shells are made by the pierce-and-draw method and close to 40 per cent. are forged by the upsetter process, casting offers distinct possibilities. There is little choice as between the pierce-and-draw and upsetter methods, but considerable economy in time, labour and material by casting was indicated. As stated above, a single casting unit of three moulding machines and auxiliary equipment will turn out between 9,000 and 10,000 shells per day (24 hrs.). A pierce-and-draw installation the writer recently saw consisted of two presses and one draw bench served with a large rotary furnace. This unit was turning out 105-mm. shells at a rate close to 4,000 per day—possibly 4,200. An installation including two upsetters and furnace would hardly duplicate this performance.

While the above comparisons are interesting, there are other factors of more importance right now. The trench mortar is a light, short-range weapon employing a comparatively small charge of gunpowder as a propellant. The stresses brought to bear on its projectile are of a lower order than those to which long-range artillery shells are subjected. Hence, porosity of an order not detectable by factory inspection methods might prove dangerous when the shell is subjected to the greater stresses produced within the barrel of a long-range cannon. For this reason, and the further fact that a superior casting technique must be employed, few artillery shells are being produced by casting at this time.

PROBLEM OF ABSENTEEISM

REDUCING LOST HOURS

A pamphlet issued by the Ministry of Labour, under the title of "The Problem of Absenteeism," states that the increasing strain on the man-power resources of the country in order to meet the requirements of the Services, the war industries and those other industries whose maintenance is essential to the life of the community, makes it imperative that continuous and effective attention should be given to the problem of absenteeism.

While it is generally recognised that absenteeism causes a direct loss of production, there has been at the same time a tendency to meet this loss by demanding more labour from the dwindling supply rather than by concentrating on the problem itself with a view to reducing it to the unavoidable minimum. The shortage of labour, it is added, now makes it impossible to rely on this solution and the efforts of industry must, therefore, be directed through its works committees, production committees, personnel departments and otherwise to finding an alternative.

The Ministry of Labour and National Service is convinced that a real effort by industrial management to attack psychological causes of absenteeism is the greatest single contribution that can be made to a solution of the problem. Another important contribution which managements can make is to arrange the "planned" hours of working of individuals or of sets of workers with some regard to their personal circumstances.

Among the steps recommended to reduce absenteeism is to ensure that the extent of it is known, together with its causes. To assist managements the Ministry has prepared a "model" form of record (A/P.L. 106), copies of which may be obtained from H.M. Stationery Office or any bookseller.

It is understood that 600,000 people are away from work every day in the industries covered by Essential Work Orders. In about two-thirds of these cases the causes are illness and accidents.

SCOTTISH GIRLS IN ENGLISH WORKS

English industrial plants have been exonerated by a T.U.C. delegation headed by Baillie Elgar, of Glasgow, which has reported on accusations which have been rife in Scotland at the transfer of Scottish girl labour. Girls who were formerly earning £1 per week as domestic servants are now earning up to £6 as engineering and munition workers, it is stated, and would not consider returning to their former employment. The deputation found only that some girls under 20 are earning less than they anticipated, but these cases are being inspected to ensure that there is no hardship. The delegation was considerably impressed by the welfare and other arrangements made by the Ministry of Labour and the detailed care taken by Scots girls.

STANTON *Dale* REFINED PIG IRON

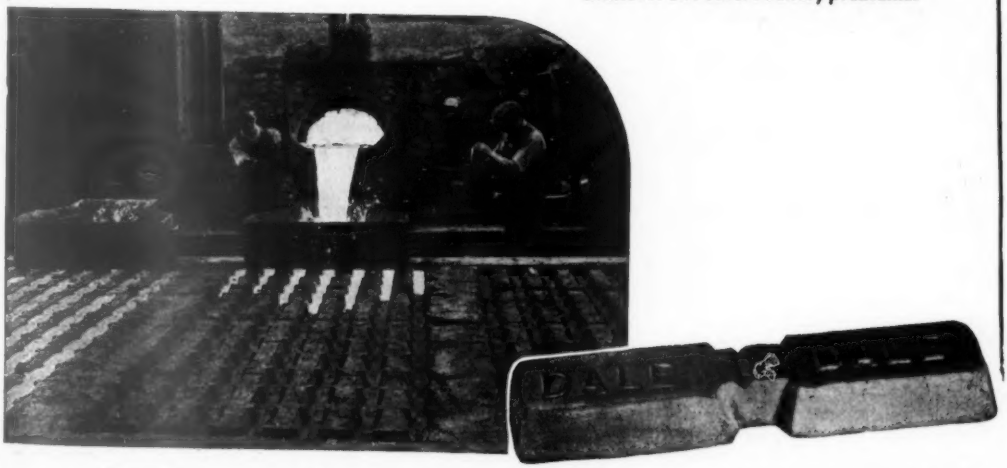
IS CHARACTERISED by closeness of grain structure, uniformity of composition and fine graphitic carbon evenly distributed.

IS PRODUCED to guaranteed analysis in seven standard grades.

CAN BE MADE to customers' individual requirements with total carbon from 2·6 per cent. upwards.

SHOULD BE USED to tone up high phosphorus irons and scrap, to replace Hematite, and to produce castings for all high duty purposes.

Users are invited to avail themselves of the Stanton Technical Service which offers free expert advice on special mixtures and other Foundry problems.



THE STANTON IRONWORKS COMPANY LIMITED, NEAR NOTTINGHAM

NEWS IN BRIEF

WE UNDERSTAND THAT negotiations are in progress for the formation of one union of foundry workers, the move being initiated by the National Union of Foundry Workers, the largest of the unions catering for foundrymen.

IN A WRITTEN REPLY to a question by a Member of Parliament, Col. Llewellin, Minister of Aircraft Production, says that all new engine test plants will, in future, be of a design which will enable waste power to be turned to useful purposes, in view of the need to conserve power and fuel.

ALL ORDERS for asbestos cement sheets, flat and corrugated, must in future be sent to the Asbestos Cement Operating Committee, Ministry of Works and Planning, Lambeth Bridge House, London, S.E.1. They should be made out to the manufacturer from whom the buyer wishes to obtain the material.

ENGINEERING CADETSHIPS, open to youths of 16 to 19 years of age, inclusive, and leading to technical commissions in the fighting services, are offered by the Government. Applications will be received by local appointments offices of the Ministry of Labour or by the Appointments Department, Sardinia House, London, W.C.2. Applicants must not be employed in any branch of engineering.

THE TRANSPORT AND GENERAL WORKERS' UNION and the General and Municipal Workers' Union have claimed increased rates for women in engineering, and the Engineering and Allied Employers' National Federation are expected to give their reply on November 17. The unions have asked that the minimum rate for women aged 18 and over shall be not less than 85 per cent. of men labourers' rates.

THE SHORTAGE of scrap iron, which was obtained in the country, had at times caused more anxiety than the shortage of pig-iron or foundry coke, which was imported, said Mr. R. J. Harne, chairman of Allied Ironfounders (Ireland), Limited, at the annual meeting in Dublin. He said that during the year they were constantly faced by the danger of having to close down owing to the shortage of materials.

THE STOCK EXCHANGE has granted permission to deal in respect of 798,438 £1 5½ per cent. non-cumulative redeemable second preference shares of the Lancashire Steel Corporation, Limited. Permission was sought because of the distribution by the liquidator of the Partington Steel & Iron Company, Limited, of that company's holding of second preference shares of the Lancashire Steel Corporation, Limited.

THE IRON AND STEEL INSTITUTE announce that a joint meeting of the Lincolnshire Iron and Steel Institute and the Iron and Steel Institute will be held on November 17, at 7.30 p.m., at the Modern School, Cole Street, Scunthorpe. Mr. A. Robinson, President of the Lincolnshire Iron and Steel Institute, will preside, and the following Papers will be presented for discussion: "The Linings of Large Basic Open-Hearth Tilting Furnaces," by Mr. A. Jackson, and "Investigations on 'Falling' Blast-furnace Slags," by Dr. T. W. Parker and Mr. J. F. Ryder.

LEGAL

Foundry Electrician's Death

The First Division of the Scottish Court of Session refused an appeal by Stewarts and Lloyds, Limited, tube manufacturers, against a decision by Lord Robertson in an action against them by Mrs. Mary Austin, or Hall, and her three children, for payment of £5,000 as damages in respect of the death of the husband and father, Thomas Renicks Hall, electrical engineer.

Hall was in the employment of the defenders, and was engaged in the inspection of the fire extinguisher for the overhead travelling crane in the moulding shop of their foundry at Coatbridge. When he had reached the top of a ladder to replace the fire extinguisher in the crane cabin, his head was struck by some portion of the moving crane. He died the same day.

Lord Robertson found for the pursuers, and awarded to the mother £1,250, and to each of the three children £500, holding that the defenders' failure to provide a safe system of working caused the accident. The Division unanimously affirmed the judgment.

PERSONAL

MR. H. R. AYTON, by mutual agreement, has relinquished his position as assistant managing director of Richard Thomas & Company, Limited, and has ceased to be a member of the board.

MR. A. E. UPTON, who has hitherto been engaged at the head office of Macrome, Limited, has been appointed works manager at Macrome No. 2 Factory, where production will be starting shortly.

MR. DAVID HUTTON, moulding manager of the firm, received a presentation at a recent gathering at the works of Anderson, Boyes & Company, Limited, Motherwell, in recognition of his long and valued service. Mr. Hutton joined the moulding department in 1906.

Wills

GRAY, ARCHIBALD, of Paisley, retired brassfounder ...	£1,051
M'MANUS, NORMAN, of Giffnock, Glasgow, foundry manager	£8,446

DISPOSAL AND ACQUISITION OF TRANSMISSION BELTING

The Minister of Supply has issued a direction under the Control of Rubber (No. 16) Order, providing for the disposal and acquisition of transmission belting without licence to users producing a valid certificate to the effect that the belting is urgently required to keep machinery in operation. Other provisions permit the disposal and acquisition of fan belts and belting forming part of the original equipment of vehicles, plant or machinery. The Direction, which is No. 1 under the Control of Rubber (No. 16) Order, 1942, came into force on November 2, and copies may be obtained from H.M. Stationery Office.

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UNITED COKE & CHEMICALS CO. LTD.
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U.S.P. 98.

COMPANY NEWS

(Figures for previous year in brackets.)

Glenfield & Kennedy—Interim dividend of 5% on the ordinary shares (same).

Arundel Coulthard & Company—Net profit for the year to June 30 last, £38,920 (£10,561); dividend of 3% (nil).

Zinc Corporation—Profit for 1941, £139,157 (£148,442); forward, after paying the fixed cumulative dividends and two participating dividends of 1s. per share (against a total of 2s. 6d.), £57,522.

Lightalloys—Profit for the year to June 28, after all charges, including E.P.T., £39,794 (£31,542); to reserve fund, £10,000 (nil); final dividend of 12½%, making 25% (same); forward, £4,511 (£5,717).

Martin Bros. (Machinery)—Trading profit for year to June 30, £16,776 (£16,983); depreciation, £916 (£852); tax, £9,633 (£6,047); net profit, £5,852 (£9,742); dividend of 12½%, £4,688 (same); forward, £25,228 (£24,063).

Yarrow & Company—Profit for the year to June 30, after all charges, £57,441 (£62,719); to general reserve, £35,000 (£40,000); dividend of 10% (same), with a bonus of 5% (same), both free of tax; forward, £34,081 (£34,140).

Ferranti—Profit for the year ended June 30, after provision for taxation, £149,855 (£172,155); depreciation, £77,662; war damage insurance, £5,757; preference dividends, £35,000; to contingency reserve, £10,000; dividend of 6%, free of tax (same) on the ordinary stock, £18,000; forward, £74,949 (£74,482).

Paterson Engineering Company—Profit for the year ended April 30, after charging depreciation, £57,981 (£36,353); staff endowment insurance, £3,500; net dividend on preference shares, £2,062; taxation, £43,130; dividend of 10% (same) on the ordinary shares and a bonus of 2½% (same); forward, £45,396 (£43,612).

T. M. Birkett & Sons—Net profit for the year to July 31, after deducting fees, A.R.P. expenditure, provision for income-tax and E.P.T., depreciation, and reserve for adjustment of contracts, £8,037 (£10,454); interim dividend of 5% (same), £2,125; final dividend of 10% (same), £4,250; to reserve, £7,500; forward, £7,185 (£13,024).

Fairbairn Lawson Combe Barbour—Trading profit to March 31 last, £191,047; depreciation, debenture and bank overdraft interest, war damage contribution, etc., £58,132; net profit, £133,115 (£111,436); taxation and contingencies, £225,868; dividend on the non-cumulative 10% redeemable first preference shares, £8,861; preferred ordinary dividend of 1s. per share, £7,500; ordinary dividend of 10%, £2,496; forward, £96,315 (£207,926).

Thomas Blackburn & Sons—Trading profit for the year to June 30, £73,377 (£38,584); fees, interest and depreciation, £8,104 (£7,554); reserves for E.P.T. and income tax, £52,356 (£17,902); further A.R.P. expenditure, £721 (£3,346); reserve for war damage payments, £525 (£1,665); dividend on the 6% preference shares, £3,600; ordinary dividend of 7½%, £9,750; to freehold properties reserve, £1,000; to general reserve, £4,000; forward, £3,026 (£3,031).

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"JAY-BEE" — Ironwork. JOSEPH BILLINGHAM, LIMITED, Providence Street, Cradley Heath, Staffs.

"TOPAZ" (Device)—Machine tools. BRASS FOUNDERS (SHEFFIELD), LIMITED, Rockingham Street, Sheffield.

"ANGLAMEL"—White metal alloys. PARAGON SMELTING COMPANY, LIMITED, 60, Greek Street, London, W.1.

"ALDUMIN"—Metals and alloys. INTERNATIONAL ALLOYS, LIMITED, Buckingham Avenue, Trading Estate, Slough, Bucks.

"COOPER SPLIT ROLLER BEARINGS"—Ball and roller bearings. COOPER ROLLER BEARINGS COMPANY, LIMITED, King's Lynn.

"DELLMAC"—Lathes, milling machines, shaping machines, etc. VARNDELL MACHINES, LIMITED, 21, Hermitage Road, Edgbaston, Birmingham, 16.

"RAMIX"—Refractory material in plastic form. CANADIAN REFRACTORIES, LIMITED, c/o Arthur W. Parfitt, Stafford House, Norfolk Street, London, W.C.2.

"IME"—Agricultural and welding machines and machine tools. IDEAL MACHINE TOOL & ENGINEERING COMPANY, LIMITED, 282, Kingsland Road, London, E.8.

OBITUARY

MR. JOHN HENRY OSBORNE, chairman and managing director of Merryweather & Sons, Limited, fire engineers and non-ferrous founders, London, S.E.10, died suddenly on Sunday last. Born in 1868, he had travelled on business in all parts of the world.

MR. WILLIAM LOMAS, chairman of J. & J. Dyson, Limited, refractory materials manufacturers, Griffs Fireclay Works, Stannington, died recently at the age of 99. Mr. Lomas died within a month of his 100th birthday. He had been connected with his firm for 56 years.

MR. ARTHUR BELLABY, who died recently at the age of 69, was for 46 years in the service of Park Foundry (Belper), Limited, of which he became commercial manager. In 1934 he formed the Derwent Foundry Company at Milford, and remained with that company when it was acquired by Glow-Worm Boilers, Limited.

HIGHER WAGES FOR BLAST-FURNACE WORKERS

Under a new wage agreement ratified by the National Union of Blastfurnacemen, Ore Miners, Coke-Oven Workers and Kindred Trades and the National Council of Associated Ironmasters, wages of blast-furnace men in England and Wales are to be advanced by a shilling per shift as from Sunday, November 1. In addition, overtime rates to men employed on the eight-hour shift system are to be increased from time and a quarter to time and a half. A similar increase is conceded to coke workers employed at the iron and steel plants and to women workers, with adjusted advances also to boys and youths.

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G.P.159

Raw Material Markets

IRON AND STEEL

Some concern is felt in iron and steel trade circles at the latest plans of the Minister of Labour to withdraw certain classes of labour from industry. Many of the younger men will soon be taken for service in the Forces and such a move will inevitably mean that more women will be required for the iron and steel works. Difficulty may well be experienced in finding these women, as, for most classes of work, only women of really good physique are suitable for employment. There has been no decline in activity among the iron and steel works, and business with Government departments and other high-priority consumers is still absorbing the bulk of the outputs.

In some districts the demand for light castings has recently displayed a considerable improvement, but foundries are far from being fully employed, and there is no likelihood of sufficient business coming forward to enable works to operate on a full-time basis. In the aggregate, these foundries are taking up quite considerable tonnages of high-phosphorus iron, supplies of which are ample for their needs. This type of iron is also being used in the heavy engineering foundries, although it is not suitable in many respects, and better qualities are being called for. Medium-phosphorus and refined grades of iron and steel scrap are freely utilised in the engineering foundries. Large quantities of low-phosphorus and hematite irons would be used were they available, but the Control are only sanctioning deliveries of these descriptions when their use is imperative.

Current demand for foundry coke is sufficient to keep the coke ovens employed briskly, but adequate tonnages are being sent forward to points of consumption, while stocks at many works are at a very gratifying level, especially among the larger users whose accommodation for building up reserve stocks is extensive. The smaller users are not, of course, so fortunately placed, but they are getting regular deliveries. For delivery to Birmingham and Black Country stations, the current price of Durham best foundry fuel is 69s. 3d. per ton. This quotation is officially controlled and is subject to change at any time. Consequently, a rise-and-fall clause is contained in all contracts.

The recent introduction of higher rates of pay in the steel industry will not be followed by any rise in selling prices, as is the custom in peacetime. The Government is definitely against any increase in selling prices which can possibly be avoided, and other means for compensating steelmakers for the burden of additional wage bills are preferred. Most descriptions of steel continue to be in great request. Plates are fully taken up by the ship, tank and wagon builders and by other users, and makers' capacity is extended to the utmost limits. Special-quality steel sheets, bright-drawn steel and cold-rolled strip are in heavy demand by Government departments and by other important consumers, so that producers are assured of continuous activity over a long period. Manufacturers of aircraft, munitions, armaments, etc., are exerting strong pressure for special carbon and alloy steels and demand is, in fact, accelerating and is being met, where possible, by bringing into operation additional units of

NON-FERROUS METALS

Consumption of tin for both military and civilian purposes has been reduced where possible, so that available supplies may be utilised to the best advantage. Further economies may be expected, as the experts are continually working out new means by which tin might be saved. Every effort is being made, too, to foster production in the tinfields remaining under the charge of the Allies. The Japanese claim that tin-dredging companies now operating in Selangor are the Ayer Hitam and Petaling, while the open-cast mine Sungei Besi is also operating again. It is further claimed that the refloated dredges are working to schedule. Tokyo states that, with regard to labour, 70 per cent. of the workers employed in privately owned mines before the war has been re-engaged, while 90 per cent. of the former clerical staff is back at work.

There is nothing fresh to report in copper, supplies of which for essential purposes are quite sufficient. Consumption is at a very high level and the authorities are anxious to conserve available supplies for high-priority uses only. While every effort is being made to maintain production at recent high levels, the shortage of suitable labour is a factor mitigating against such an achievement. The shortage is felt not only in Empire copper mines, but also in the United States and Africa.

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